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3,404,090

WATER BASE LUBRICANT

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4 Claims. (Cl. 252-47.5)

ABSTRACT OF THE DISCLOSURE

A pyrimidine thione and amine oxide composition for use as a water base lubricant and a process for imparting lubricity to aqueous systems.

BACKGROUND OF THE INVENTION

This invention pertains to a composition comprising an N-secondary-aliphatic-hexahydropyrimidine-2-thione, and a bis(2-hydroxyethyl) aliphatic amine oxide; and a process utilizing said composition for imparting lubricity to aqueous systems.

In various fields where lubricants are required, it has been found that organic oils are not completely satisfactory. For example, in secondary oil recovery systems, wherein water is pumped into the ground to force oil to the surface, there is a tendency for oil lubricants to plate out upon the pump. Further, when oils are used as cutting fluids, considerable time is often spent in removing the oils from the product. In addition, organic oils may present a fire hazard, they often form emulsions, and they may not be compatible with other additives to the water systems. Also organic oils, such as mineral oil, tend to lose lubricity under certain light and pressure conditions.

Recently, a water base lubricant comprising water and bis(2-hydroxyethyl) aliphatic amine oxides has been disclosed.

SUMMARY OF THE INVENTION

We have discovered that combining bis(2-hydroxyethyl) aliphatic amine oxides with N-secondary-aliphatic hexahydropyrimidine-2-thiones results in a composition exhibiting synergistic water soluble lubricity. We were surprised to find that this combination imparts water soluble lubricant properties greater than would be expected if the compounds acted independently when used at the same total quantitative amounts. It should be understood that synergistic activity is a relatively rare and unexpected occurrence. Further, our synergistic composition is non-inflammable and is compatible with organic additives such as antifreeze materials, corrosion inhibitors, thickeners, and other desirable additives to the water. In addition, organic oils may be omitted from our process for imparting lubricity to water systems, thereby there is no danger of rancidity, forming of sludge or other degradation products.

Therefore, it is an object of this invention to provide a new composition having utility as a water base lubricant. Another object of this invention is to provide a water base lubricant composition that exhibits synergistic lubricity and is compatible with organic additives such as antifreeze materials, corrosion inhibitors, thickeners, etc. Still another object is to provide a water base lubricant that is light and pressure stable. A further object is to provide a process for imparting lubricity to aqueous systems by means which do not require the addition of organic

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oils. Other objects and advantages will become more apparent from the ensuing description and examples.

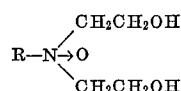
DETAILED DESCRIPTION OF THE INVENTION

A specific embodiment of our invention may be exemplified by the composition comprising (A) N-(C₇-C₉ sec-alkyl)hexahydropyrimidine-2-thione and (B) bis(2-hydroxyethyl)cocoamine oxide. While substantial synergistic lubricity is exhibited when the proportions by weight of component (A) to component (B) of this composition range from about 1:5 to about 5:1, particularly desirable results are obtained as the proportions approach 1:1, such as at 3:1, 1:3, 2:1, 1:2 and 1:1. It will be understood that proportions outside this range will exhibit some degree of lubricity.

In another embodiment of our invention, we introduce into water at least 20 parts, per million parts of water by weight, of (A) an N-sec-alkyl-hexahydropyrimidine-2-thione wherein the secondary-alkyl radical contains from 6 to 15 carbon atoms and (B) a bis(2-hydroxyethyl) aliphatic amine oxide wherein the aliphatic radical contains from 6 to 22 carbon atoms, the proportions of (A) to (B) being as illustrated for the composition set forth hereinabove. A preferred concentration of the pyrimidine thione and amine oxide composition is about 50 to 150 parts of the composition per million parts of water, and the upper limits of this concentration do not appear critical. We may use 500 parts of the amine oxide-pyrimidine thione compositions, or more, per million parts of water.

Illustrative amine oxides having utility as one component in our composition have the structure

FORMULA I

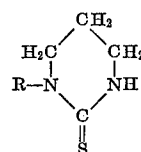


wherein R is an aliphatic hydrocarbon radical containing from 6 to 22 carbon atoms. R may be straight or branched chain, saturated or unsaturated groups such as octyl, nonyl, N-(C₇-C₉ sec-alkyl), dodecyl, tridecyl, tetradecyl, pentadecyl, N-(C₁₁-C₁₅ sec-alkyl), hexadecyl, octadecyl, octadecenyl, octadecatrienyl, docosyl, eicosyl, and mixtures of radicals such as are derived from naturally occurring glycerides such as coconut oil, tallow, soybean oil and the like. Coconut oil contains a mixture of saturated and unsaturated aliphatic hydrocarbon radicals from C₆ to C₁₈ and is primarily N-dodecyl. Tallow contains a saturated and unsaturated mixture from C₁₂ to C₂₀, primarily N-hexadecyl, N-octadecyl and octadecenyl. Soybean contains a saturated and unsaturated mixture from C₁₄ to C₂₀, primarily octadecenyl and octadecadienyl.

The preparation of useful bis(2-hydroxyethyl) aliphatic amine oxides may be by the reaction with an excess of hydrogen peroxide as is known in the art.

Exemplary N-sec-alkyl hexahydropyrimidine-2-thiones useful as the second component of our synergistic combination have the structure

FORMULA II



wherein R is an individual or mixed chain length N-sec-

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thione and said amine oxide is bis(2-hydroxyethyl)coco-amine oxide and said proportion is about 2:1.

3. The composition of claim 1 in which said composition displays synergistic lubricity when used with brine in a concentration of at least 20 p.p.m.

4. The composition of claim 3 in which said pyrimidine thione is N-(C₇-C₉ sec-alkyl)hexahydropyrimidine-2-thione and said amine oxide is bis(2-hydroxyethyl)coco-amine oxide and said proportion is about 1:2.

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